

## CAMSHAFT ADJUSTING UNIT

### CROSS-REFERENCE TO RELATED APPLICATIONS

**[0001]** This application claims the priority of German application 102 51 533.6, filed November 4, 2002, the disclosure of which is expressly incorporated by reference herein.

### FIELD OF THE INVENTION

**[0002]** The invention concerns an adjusting device for two subassemblies standing in rotary drive connection, especially for the adjustment of a camshaft relative to the drive wheel that drives it, with a control gear arranged between the two through which an electric motor for adjustment is drivable. The arrangement is already known from DE 41 10 195 C2.

### BACKGROUND OF THE INVENTION

**[0003]** With this known adjustment arrangement for two subassemblies standing in rotary drive connection, especially for the adjustment of a camshaft relative to the drive wheel that drives it, with a control gear arranged between the two that is drivable via an electric motor for adjustment, and wherein the stator of the electric motor is stationarily arranged, the control gear is pivoted together with the rotor of the electric motor on a shaft piece relative to the camshaft, and the shaft piece is connected to the camshaft in a torsion-resistant manner.

## SUMMARY OF THE INVENTION

[0004] The proposed solution of an arrangement, relative to the known state of the art, has the advantage that by using a stationary direct current commutator motor, the system has a considerably longer lifetime, and the cost for realizing an arrangement of the invention is significantly reduced.

[0005] With the proposed solution, the use of a co-rotating direct current motor or the transfer of electric energy with slip rings can be dispensed with, so that mechanical susceptibility is also reduced with the arrangement of the invention.

[0006] The arrangement specified in the invention is represented in the drawing and is explained in greater detail below.

## BRIEF DESCRIPTION OF THE DRAWINGS

[0007] The sole figure illustrates the arrangement for adjusting the camshaft with a direct current commutator motor.

## DETAILED DESCRIPTION OF THE INVENTION

[0008] In the figure represented, the camshaft is designated with the reference number 10. Component 11 is a sprocket wheel, and a planet with gear is

designated with the reference number 12, wherein these components are situated on the cylinder head of the motor of a motor vehicle. A stationary, direct current commutator motor 14 is installed on the crankcase 13. The rotor of the motor is connected to the entry of a self-inhibiting reduction gear, or with a reduction gear that is encumbered with high internal friction, wherein this reduction gear is connected on the one hand with the camshaft and on the other with the drive wheel and serves to adjust the phase angle.

**[0009]** When the internal combustion motor is running, the rotor of the electric adjusting motor rotates at the rotational speed of the camshaft. If an adjustment of the camshaft is to take place, then the adjusting motor must rotate slightly faster or slower until the desired adjustment angle is reached. Afterward the motor must again rotate at the rotational speed of the camshaft in order to retain the adjustment. The actuation for the various rotational speeds takes place by means of a central control device, which is not represented in the figure.

**[0010]** The synchronization of the motions takes place automatically via the mechanical commutator, and the regulation must only compensate for the remaining slow changes or set the desired phase angle.

**[0011]** The following must also be stated for an understanding of the arrangement of the invention. A deviation of the rotational speed of the adjusting motor from the rotational speed of the camshaft brings about an adjustment of the

camshaft. For this reason, with a stationary adjusting motor, its rotational speed must be very precisely maintained in harmony with the rotational speed of the camshaft. Previously, in known systems, adjusting motors with low-inertia torque and a rapid regulation were necessary for this, in order to follow the high internal combustion motor dynamics.

[0012] When a self-inhibiting gear or one constructed with high internal friction is used, the demands on the motor and the regulation unit are diminished. The rotor of the adjusting motor is held essentially by the camshaft and not by its own drive at the corresponding rotational speed. A stationary, direct current commutator motor is well suited for this. The synchronization takes place automatically by means of the mechanical commutator, and the regulation must only compensate for the remaining slow changes or set the desired phase angle.

[0013] The foregoing disclosure has been set forth merely to illustrate the invention and is not intended to be limiting. Since modifications of the disclosed embodiments incorporating the spirit and substance of the invention may occur to persons skilled in the art, the invention should be construed to include everything within the scope of the appended claims and equivalents thereof.